

What is claimed is:

- 1           1.     A method of performing a join in a database system comprising:  
2                 receiving a join query containing at least one function selected from the  
3     group consisting of a selection predicate applied on a complex attribute, a projection  
4     applied on a complex attribute, and a user-defined data type method;  
5                 determining a cost associated with applying the function on a first table  
6     and a cost associated with applying the function on a second table; and  
7                 selecting a join path based on relative costs of applying the function on the  
8     first and second tables.
- 1           2.     The method of claim 1, wherein selecting the join path comprises applying  
2     the function on one of the first and second tables associated with a lower cost.
- 3           3.     The method of claim 1, wherein determining the costs comprises  
4     determining the respective cardinalities of the first and second tables.
- 5           4.     The method of claim 3, wherein determining the cost of applying the  
6     function on the second table comprises determining the cost of a join table that is a result  
7     of a join of the first table and another table.
- 1           5.     The method of claim 3, wherein selecting the join path comprises applying  
2     the function on one of the first and second tables that has the lower cardinality.

1           6.     The method of claim 5, wherein the function comprises a selection  
2 predicate applied on a complex attribute of the first table, the join query further  
3 containing a projection applied on a complex attribute of the first table, the method  
4 further comprising:  
5                 determining a cost associated with applying the projection on the first  
6 table and a cost associated with applying the projection on the join table,  
7                 wherein selecting the join path comprises applying the projection on one  
8 of the first table and the join table associated with a lower cost.

1           7.     The method of claim 6, wherein selecting the join path comprises applying  
2 the projection on one of the first table and join table with the lower cardinality.

1           8.     The method of claim 1, further comprising identifying the function as a  
2 costly function.

1           9.     The method of claim 1, wherein the receiving, determining, and selecting  
2 acts are performed by an optimizer module.

1           10.    The method of claim 1, wherein determining the costs of applying the  
2 function on the first and second tables comprises determining the costs of applying the  
3 function on object relational tables.

1           11.    An article comprising at least one storage medium containing instructions  
2 that when executed cause a database system to:  
3                 receive a join query containing at least one function selected from the  
4 group consisting of a selection predicate applied on a complex attribute, a projection  
5 applied on a complex attribute, and a user-defined data type method; and  
6                 determine a join path for the join query based at least in part on a cost  
7 associated with application of the function on the complex attribute.

1           12.    The article of claim 11, wherein the join query specifies the function being  
2 applied on a first table, and wherein the instructions when executed cause the database  
3 system to determine the join path by applying the function on a second table different  
4 from the first table.

1           13.    The article of claim 12, wherein the second table is a result of a join of the  
2 first table and another table.

1           14.    The article of claim 11, wherein the join query specifies the function being  
2 applied on a first table, and  
3                    wherein the instructions when executed cause the database system to  
4 determine the join path by applying the function on a second table having a lower  
5 cardinality than the first table.

1           15.    The article of claim 11, wherein the instructions when executed cause the  
2 system to determine the join path by applying the function on one of a first table and  
3 second table having a lower cardinality.

1           16.    The article of claim 15, wherein the second table is a join of the first table  
2 and another table, and wherein the instructions when executed cause the system to  
3 determine the join path by further specifying a join of the second table and a third table to  
4 produce a fourth table.

1           17.    The article of claim 16, wherein the join query further specifies  
2 application of a second function selected from the group consisting a selection predicate  
3 applied on a complex attribute, a projection applied on a complex attribute, and a user-  
4 defined data type method, the second function being applied on a third table,  
5                    wherein the instructions when executed cause the database system to  
6 determine the join path by further applying the second function on one of the third table  
7 and a fourth table with a lower cardinality,  
8                    wherein the fourth table is a join result of the third table and another table.

1 18. A database system comprising:  
2 a storage system to store tables; and  
3 an optimizer to receive a join query that specifies a function selected from  
4 the group consisting of a selection predicate applied on a complex attribute, a projection  
5 applied on a complex attribute, and a user-defined data type method,  
6 the optimizer adapted to select a join plan based at least in part on a  
7 comparison of a first cost of applying the function on a first table and a second cost of  
8 applying the function on a second table.

1 19. The database system of claim 18, wherein the optimizer is adapted to  
2 select the join plan that applies the function on the one of the first table and second table  
3 with a lower cardinality.

4 20. The database system of claim 19, wherein the second table is a join result  
5 of the first table and another table.

6 21. The database system of claim 20, wherein the join query specifies the  
7 function being applied on the first table.

8 22. The database system of claim 20, wherein the first and second tables are  
9 object relational tables.

1 23. The database system of claim 19, wherein the join query further specifies  
2 application of a second function selected from the group consisting of a selection  
3 predicate applied on a complex attribute, a projection applied on a complex attribute, and  
4 a user-defined data type method, the join query specifying the second function being  
5 applied on a third table, the optimizer adapted to select a join plan that applies the second  
6 function on one of the third table and a fourth table with a lower cardinality, the fourth  
7 table being a join result of the third table and another table.

